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ABSTRACT

Educational accomplishments of the People's Republic of China have been achieved by emphasis on moral, intellectual, and physical development of every individual, and on schooling combined with and in preparation for productive labor. Open-door schooling combines in-school learning with out-of-school practice, so students learn about life and work in the actual setting of "big classrooms"--factories, communes and army units. Among new forms of higher education for rural development are: an agricultural college giving peasants from agricultural communes a 3-year course in socialist principles of development and skills in agricultural science and technology, after which the peasants return to their communes; scientists in rural areas giving 3-month courses in water conservation, stock breeding, and crop cultivation to upgrade skills of local peasants and avoid problems of students leaving the countryside with expectations of work in cities; or college classes alternating with work on agricultural production teams in students' home communes. Factories operate their own worker-colleges. Neighborhood residents' committees solve community problems and organize study groups. China's teachers come from various backgrounds, with emphasis on practical experience and leadership qualities. Changes in education continue, with a standardized 10-year universal education program for young people, and increasing emphasis on science and technology. (MH)

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INTRODUCTION

Through its series of Occasional Papers, the NFE Information Center seeks to provide a forum for the exchange of ideas among those pioneering in the practice of non-formal education. In dynamic, relatively young fields of inquiry and experimentation it is especially important to bring budding "ideas in progress" to the light of public scrutiny. We intend the papers in this series to provoke critical discussion and to contribute to the generation of knowledge about non-formal education.

In this paper, Mary Kay Hobbs draws upon her field observations in China during 1976 to describe how the People's Republic is trying to provide a broader base for popular participation in development. She considers several new educational designs which combine education and production. Explaining who are the new teachers and the new students, Ms. Hobbs also looks at what and how people learn within several kinds of organizations. Finally, she describes recent policy changes which indicate a trend toward more formalized education while keeping some of the proven strengths of NFE.

We invite your participation in this dialogue and welcome your comments.

Joan M. Claffey
Director
Non-Formal Education Information Center

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New Patterns in Teaching and Learning:
A Look at the People's Republic of China

Mary Kay Hobbs

Education for Development

The accomplishments of the Chinese of the People's Republic of China in the areas of health, education, rural development, and industrial growth in the thirty years since the country was established have been acknowledged outside China with increasing respect and interest. Some idealize the changes, referring to them solely in terms of socialist ideology and advocating the same revolutionary path of development for other countries. Other are skeptical and suspicious of Chinese progress, denying that any positive lessons can be learned from the Chinese experience.

Both of these views may, indeed, be short-sighted. Each nation must make decisions on how to achieve a good life for its citizens based on its own history, resources, and priorities. But, because of the similar nature of development problems, the variety of possible choices, and the interdependency of nations and ideas, much can be gained by having a better understanding of how China has mobilized its resources of people to begin to achieve its development goals.

> *There is an ancient Chinese fable called "The Foolish Old Man Who Removed the Mountains." It tells of an old man who lived in northern China long ago; he was known as the Foolish Old Man of North Mountain. His house faced south and beyond his doorway stood two great peaks, Taihang and*

Wangwu. These peaks blocked his view.

With great determination, the old man led his sons in digging up the two mountains, working only with a hoe. Another elder in the village, known as the Wise Old Man, saw them and said with a very superior attitude: "How silly of you to do this. It is quite impossible for you three to dig up these two huge mountains." The Foolish Old Man replied, "When I die, my sons will carry on. When they die, there will be my grandsons. And then their sons and grandsons. And so on forever. High as they are, the mountains cannot grow any taller, and with every bit we dig, they will be that much lower. Why, then, can't we clear them away?"

And so, the story goes, God was very moved by his certainty and determination, and he sent down two angels who carried away the mountains on their backs.

Young and old alike, all Chinese people know this story today. It is one of the ways they like to explain their efforts to overcome their many problems as a poor nation with many people. The problems which face China are not unlike those which face many other nations.

China is a large country with a land area about the same as that of the United States. But China has more than 850 million people, nearly four times as many as in the U. S. The land which is available to grow food is less than 20 percent of that huge area because of the mountains and deserts. Water and good soil are not equally distributed in all areas, so opening new land for crops is a major task with many problems. Also, China is not a large industrial nation. More than 80 percent of the people live in the rural areas where they work the land with simple tools. This has been the way of life for many centuries. China is rich in some natural resources and in people, but poor in the amount of money that the government or individuals have to spend in the development of agriculture and industry.

Despite these handicaps, the same ones which exist in similar forms in many developing nations, China is now able to feed its people without depending on outside sources. Over 90 percent of China's children receive at least five years of primary school, and adults of all ages and occupations are involved in a variety of continuing education programs which are designed to give them more skills as individuals and which are directly related to increasing the nation's productivity in agriculture and industry.

What Are China's Development Goals?

If you ask the people in China what goals they are working toward, you will receive similar answers from many types of people. A peasant in the village wants more mechanized equipment for the work team of which he is a part, his ultimate aim greater productivity of the land. The equipment he needs may be a hand tractor for plowing or tube wells and pumps to make water more accessible. He wants a bicycle, radio, and more clothing for his family. He also wants more opportunities around him: opportunities for education, work, and better health.

A medical worker in the same village will express the desire for a small truck to serve as an ambulance for the small health stations scattered around the country. Housewives want better sewing machines for the take-home work they do for the local clothing factory in their neighborhood. Men and women working in the factories want more mechanized machinery to speed up the work so they can produce more in a shorter amount of time and under safer conditions. The staff of hospitals want better equipment and medicines, along with more trained technicians and doctors. School personnel want better laboratory facilities to aid students in learning how to run machines or farm better. Administrators and officials in all areas want people to participate more fully in finding solutions to social and economic problems.

Most of these individual goals are present in the overall development priorities which China has set for herself. These goals and the

reasons for them form the basis for China's development policies. There appear to be two major priorities: achieving more applied technology and achieving more education and participation by the people. Four directions characterize China's development process:

1. China is working toward increased mechanization of agriculture and industry. This will free people from time-consuming manual chores and enable them to work on other projects for development. It also aims to increase production.

2. China is working to decentralize industry, agriculture, and authority. This will help to develop the rural areas and improve the lives of the people where they live. It is directed toward helping to avoid the problem of people moving to the large cities where they may not be able to find work or are less needed than they are in rural areas.

3. China is encouraging mass participation in community affairs and in work positions. This will enable people to have a say in those things which affect them. It also is intended to lead to more sharing of ideas, skills, and human resources to help solve problems.

4. China is working to "Reduce the Three Differences": the difference between the rural and urban areas, the difference between workers and peasants, and the difference between manual and intellectual labor. The Chinese say that it is the gap between these differences that causes unequal rates of development and creates misunderstandings and social unrest among people. Reducing the three differences does not mean that everyone will do the same job or will live the same kind of life. It does mean that there should be more contact and sharing of work experiences on a daily basis between urban and rural people, between industrial workers and peasants, and between workers and intellectuals. The Chinese believe that such exchanges broaden the outlooks of all involved and will lead to greater understanding and appreciation of the roles that everyone plays in building the nation.

These goals are shared by nearly all the people of China. They talk about them among themselves, they write about them in the newspapers and journals, and they see themselves as a people unified through them. In addition, these are goals, or directions, which most countries express

a desire to achieve. As for the resources needed to achieve these kinds of goals, two are immediately apparent: a technology that is appropriately chosen and applied to meet the conditions of the people and the environment, along with a population that understands and supports the goals and which is trained in the skills and processes that will help each individual achieve the selected goals.

Realistically, it should be noted that these goals are something the people would like to see happen. The Chinese are also very aware that reaching their goals means overcoming several great obstacles. The peasant in the village, the housewife in the neighborhood, the worker in the factory, and the worker in management and government all agree that achieving the goals is a difficult task. They say, "We lack the training and we lack the experience in working with new technologies." Thus, the Chinese have placed great emphasis upon education to overcome the problems of training and experience. Education, both in-school and out-of-school, plays an important role in Chinese life. Education provides the key to raising the level of knowledge and experience, the key to combining theory and practice, and the key to linking the stated goals with what actually happens in the development process.

The Main Tasks of Education in China Today

Moral, Intellectual, and Physical Development

The Chinese are very clear about the purpose which education must serve. First, they believe education must be concerned with the moral, intellectual, and physical development of every individual.

Moral development is given the highest priority; it is closely associated with what others call political education. Its purpose is to give everyone an understanding of China's socialist government with the philosophies of Marx, Lenin, and Mao Tse-tung as the basis, and to foster the attitudes that will enable China to achieve the four development goals mentioned earlier. In this context, the concepts of morality, philosophy,

and politics are used interchangeably: the Chinese see them as different facets of the same idea but inseparable from each other. The basic and most important public ethic that is taught today is that knowledge should be used to serve the people.

Intellectual development means the building of knowledge and skills such as reading, writing, mathematics, and science needed to prepare people for useful occupations. In 1949, eight out of ten Chinese were illiterate. For nearly fifteen years, from 1950 to 1963, the two top priorities in education were mass literacy campaigns and the establishment of schools to extend basic education to a broader segment of the population. Today, with a literacy rate of over 80 percent, the intellectual emphasis is placed on providing additional forms of skill training to meet emerging occulational needs: middle-level technicians for agriculture, industry, and medicine.

Physical development is practiced in many forms. In the early morning hours, people of all ages can be seen doing exercises by themselves or in small groups on the streets in front of their homes or in the parks. The older people practice traditional, centuries old forms such as Tai Chi Chuan or Wu Shih; the younger people do modern calisthenics, jogging, or a combination of modern and traditional forms of exercise. Sports play a large part in schools, and there is a great deal of competition among groups, providing a training ground for China's amateur and professional athletes. While physical activity is stressed for its own health and recreational values, the Chinese also see physical education as important to the nation's defense. School children are trained in strategies of defense and learn how to handle weapons.

Of the three areas of development, moral education ranks the highest: the holding of proper attitudes above intellectual achievement and high grades. For example, a person's attitudes toward his fellow man play a decisive role in whether he or she is admitted to any institution of higher learning. This may seem contradictory in a nation attempting to move rapidly forward in agricultural and industrial production, thus

requiring more skilled manpower at seemingly any cost. A worker in a chemical plant explains it in the following manner: "Because the attitudes that a person has determine his behavior toward others, we desire attitudes that encourage people to work together and cooperate to help solve problems that we have in our factory. We also criticize attitudes that lead individuals to work for self-gain, especially for gain in materials or position that might come at the expense of others. Almost anyone can acquire knowledge, but if a person does not see that the purpose of knowledge is to apply it in a helpful way to those around him, what good is he? On the other hand, if a person is a good worker, can communicate well with other people, and desires to use his knowledge to help society, then it would be good for him to have the opportunities for more study because we know that his learning will not stay locked in his head."

Schooling in Preparation for Work

The second basic principle which guides all learning in China today is that it must be combined with productive labor. There are two reasons for this. First, schooling should not, it is believed, separate students from the work force by having them learn only from books and lectures; afterwards, they will discover that the learning is difficult to apply when they do go to their jobs. Second, there is so much work to be done to raise the country's production and standard of living, no one should be exempt, it is contended, from making a contribution to the economy.

Combining education with productive labor does not follow a set pattern. How it is done is decided by the people in the local situation and depends upon the actual needs, resources, and conditions. For instance, during the harvest seasons, students of all levels may go to the fields, on foot or in buses with their classes, to help bring in the crops. Children in primary schools may spend two or three hours a week during school hours making their own writing pads by folding the papers and attaching them to a simple binding. Many middle schools raise their own vegetables.

Some are able to produce enough to sell a surplus and a few are even self-sufficient in that their enterprises are able to pay for teachers and for the school's maintenance. Some colleges and universities have contracts with local factories whereby the engineering classes produce television or radio parts. Advanced students gain practical experience under close supervision, often by someone from the factory; thus, the factory also is able to increase its output. The students' labor is not free, however. The payment students receive goes into a fund to buy more equipment for the school in order to give students even greater opportunities to practice what they study in books.

The Changing Nature of Schooling

Bringing education to the people on a broad scale has been a major achievement since the founding of the People's Republic. Today, the number of university, middle, and primary school students is more than one-fifth of the total population. There are 7 times as many primary school students and 24 times as many middle school students, compared with the highest number in any year before 1949. More than 90 percent of all school children are in school. And, universities by the end of 1974 had graduated 12.6 times the number in the twenty years before 1949.

An even greater change has taken place in the countryside, mountain areas, border regions, and national minority areas. China provides a great variety of schools to serve different needs. Apart from higher education institutes, primary, and middle schools, there are many workers' colleges run by factories, colleges run by farms, short-term training courses run by universities, correspondence courses, and vocational and technical schools to serve agriculture. In addition to the public schools run by the state, large numbers of schools have been established in the outlying areas with state assistance, particularly in the poorer and isolated regions. In order to make attendance convenient, classes are arranged to suit the characteristics of life in farming and pastoral areas. There are, for example, "mobile schools" with traveling teachers who make the rounds

of remote villages composed of only a few families. There also are "horse-back schools" where teachers and their tent schools move from pasture to pasture along with the herdsmen and their children.

Achieving Change: "Before and After Liberation"

The present forms of schooling did not spring up overnight. They are the result of new ways of looking at educational needs and development and at ways of utilizing human resources. These educational designs came as a result of nearly thirty years of experimentation and adaptation. The forms still are changing. The major changes in the form and substance of educational institutions, however, occurred in two stages. It is impossible to converse about education with a Chinese without hearing about the way schools were "before and after Liberation" and "before and after the Cultural Revolution". These are the broad measures the Chinese use to gauge progress. "Liberation" means October 1949 when the People's Republic was established. The "Cultural Revolution" occurred between 1966 and 1969, a period of turmoil while many segments of the population fought (usually verbally, but occasionally with arms) over what was to be the proper way to achieve the development goals. During this time, many of the educational institutions were shut down. Both events had consequences for the design of education. In the period after Liberation, schooling was extended into many areas which previously had had no schools; in addition, new educational goals were identified, although they often remained primarily on paper. The period after the Cultural Revolution saw some real changes in schools in order to put into practice such policies as combining education with labor. By examining some particular types of education, one can gain some understanding of how the present educational policies have been implemented.

Open-Door Schooling

The No. 28 Middle School in the northeastern industrial city of Shenyang has 36 classes, although not all meet in the school at all times. Some for example, are at what the Chinese call their "big classrooms" --

factories, communes, and army units. For six years, this school has been experimenting with "open door" schooling, an educational method which combines in-school learning with out-of-school practice. In their "big classrooms," students learn about life and work in the actual setting.

A member of the school's revolutionary committee* and some of the students described the changes that have taken place. Before the Cultural Revolution began in 1966, No. 28 Middle School**, like many other schools throughout the country, operated on a system based on books, classroom lectures, and teacher authority. Students and teachers had little or no contact with the world of work, and instruction was geared to university preparation for the 15 percent of the students who were most likely to find places in China's universities in the big cities.

During the Cultural Revolution, the school was shut down. Students, teachers, and administrators, many of them Communist party members, questioned and critized the school's form of education. In late 1968, Chairman Mao issued a document providing a sense of direction and a method of re-establishing order. The statement, "the working class must exercise leadership in everything," led to the formation of groups known as Mao Tse-tung Thought Propoganda Teams. A group of people from the Sheyang #6 Ceramics Factory entered into discussion with the teachers and students of No. 28 Middle School and helped them set up a new method of management, the revolutionary committee. After weekly discussions for nearly six months, the factory workers returned to their jobs and the school again opened its doors.

One of the extensive changes that resulted was a division of the

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* The revolutionary committee is the management and administrative body of most organizational units in China. It is composed of a mixture of students, teachers, and administrators elected by the people. Factories schools, communes, and even neighborhood organizations all have revolutionary committees to handle the management work of an organization.

** Primary school in Shenyang is from the first through fifth grades; middle school includes the sixth through the ninth grades.

school work into "small" and "big" classrooms. The school set up three small workshops with equipment borrowed or made by themselves from discarded factory pieces. Within six months they were able to make electric motors, electronic instruments, and to do electroplating. These activities were carried out in the physics and chemistry classrooms. Today these workshops produce up-to-standard products. The school reports that in 1973 they turned out 510 three-kilowatt motors, 640 low-voltage power supply units for teaching purposes, 2,000 silicon diodes, and 12 tons of electroplated parts.

In addition, the school started an agricultural experiment plot on school grounds and set up a 2.7 hectare* farm outside the city. Teachers and students work together producing various crops according to the season and to the particular agricultural lessons being learned.

The school also established links with fourteen outside factories which produce such things as household ceramics and electrical supplies. In another city, middle school students, who were spending a month in a similar ceramics plant, work inspecting bowls and cups for flaws after the pieces come out of the molds: not glamorous work, but acquainting the students with the processes of production as no classroom could. And because of this arrangement, the factory was able to give some of its regular workers opportunities for additional study or training in new areas without lowering production while they were gone.

Shengyang No. 28 Middle School also sent students out to work in four agricultural brigades engaged in fruit growing, forestry, and fresh water fisheries. These and the other links mentioned above have become the "big classrooms." Students study seven months of the year in the school classrooms and three months in the "big classrooms." They have a one-month holiday in the winter and another month off in the summer.

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* 1 hectare equals about 2.47 acres

These changes in the middle school not only added classrooms, but also increased the number of teachers and raised the quality of teaching. Originally the school had 112 teachers. Now there are an additional 53 part-time teachers outside the school system who do the instruction in the out-of-school period. The full-and part-time teachers together draw up a teaching plan at the beginning of each term and decide what parts of school subjects will be taught and practiced in the "big classrooms." Methods, time, place, and teachers are decided upon. Since the plans co-ordinate teaching materials with actual production in the factories and farms, the content of the students' studies is greatly enlarged. A teacher summed up the improvement by saying, "With our school-run factories and farm, we no longer have to operate machines on the blackboard and plant crops in the classroom. We've started on a new road: combining teaching with actual production and scientific agricultural experimentation."

The Importance of Learning Outside of School

With the factories and farm run by the school, why do the Chinese feel that they need to also send their students to factories and farms outside the school? This question was answered by a factory and agricultural unit with which Shenyang No. 28 Middle School has regular agreements. The Pitai Agricultural Brigade of the Forward Commune, ten kilometers north of the city, employs 300 people to raise wheat on 45 hectares of land. Fifty third-year middle school students and their homeroom teacher were there for a month to participate in farm work. The city students had hiked on foot out to the farm with bedrolls on their backs and they were living with farm families and preparing their own food. The students are no financial burden to the poorer farm families because the food costs come from the middle school budget.

The main idea is that the city students should actually live among the people who make up 80 percent of China's population and who supply the city people with their food. Students spend several hours a day working in field tasks assigned by the agricultural brigade's revolutionary

committee. Work depends on the needs and on the level of the students' knowledge of crops. Aside from farm work, other kinds of studies provide practical learning. For instance, in writing compositions, the students were asked to investigate and write up a history of the village by talking with the families with whom they lived. In mathematics, the lessons on accounting were given by the brigade's accountant. Experienced peasants, agricultural technicians (sometimes graduates from middle schools like their own), electricians, and tractor drivers are all available teachers. Combining lessons with actual farming problems makes the material lively and concrete. In all types of learning situations, the teachers are those who hold the jobs and do the work. The purpose is to have the students learn from the peasants and to gain an understanding and a respect for the work itself.

Higher Education for Rural Development

One of the most complex problems in developing countries is that of modernizing the agricultural sector, of applying scientific principles and mechanization to increase agricultural output. This is a difficult challenge because mechanization and industrial development have traditionally emerged in the context of increasing urbanization and capital intensive expansion which encourage social mobility and unequal distribution of goods and services. In this tradition, rural development has often meant the sending of specialists in scientific management, planning, and agriculture from urban universities to the rural areas.

China also inherited this approach to rural development because of the investments in industry, commerce, and education introduced by the European nations during the two hundred years before 1949. But today, China has been experimenting with new forms of education, especially in the area of higher education for rural development.

A New Type of Agricultural College

In 1971, the Shenyang Agricultural College left its campus in the city of Shenyang and relocated as five different colleges throughout the

northeastern province of Liaoning. One of these, Chaoyang Agricultural College, is situated in a poor mountainous region. The school selects its 1,200 students from among the peasants of the Peoples' Communes in a six-county area.* They return to their communes after a three year course and continue to work on the land but with a good grounding in socialist principles of development and skills in agricultural science and technology. Students choose one of the following six areas for specialization: agronomy, orchards and forestry, water conservation, water project construction, hydrology, and stock-breeding and veterinary science.

In the old Shenyang Agricultural College, everything was done to impress newcomers that they were to become high-level specialists. All courses were taught on campus in the city. Some research was done on small plots, for which farm workers were hired from outside the school to do the work while the teachers watched and explained to the students. In a follow-up study, the college found that most of the 7,000 graduates since the college was founded did not choose jobs in the countryside and those who did were unable to solve practical problems because they had not had pragmatic experience. So, during the Cultural Revolution, the question was raised, "What use is an agricultural college if its graduates are unwilling to go to the countryside and help develop agriculture?" It was concluded that perhaps they were educating the wrong type of student.

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* The commune is the largest organized unit in the countryside. Everyone who lives in the rural areas of China is a member of a People's Commune. Each commune is divided into a number of production brigades and each brigade is composed of several work-teams. So each person also belongs to a particular brigade and work team. The size of a commune varies depending on local conditions. The basic unit, the work team, is usually made up of a village of 25 to 30 families. They organize production to meet their own needs and the quotas allotted to them by the commune. The brigade is composed of several teams which own certain production facilities in common, such as workshops or agricultural machinery. They also perform certain planning and management functions. A commune may have from 20 to 100 brigades depending on the density of population in relation to land. The total land and population in a commune varies widely from 3,000 to 12,000 hectares and from 20,000 to 80,000 persons.

Scientists for the Rural Areas

Between 1968 and 1971, Shenyang Agricultural College investigated the agricultural production in the counties of Liaoning Province. They estimated that, in order to modernize agriculture in the Chaoyang area with a population of over three million people, more than 100,000 scientific and technical personnel needed to be trained. When the teachers and administrators first came to the area, they did not construct school buildings immediately. For over a year, they lived in the homes of commune members and joined them in the planting and harvesting of their crops. During this period, they offered short-term courses of three months in water conservation, stock-breeding, and the cultivation of sorghum, corn, and cotton. From 1971 to 1973, more than 10,000 people received training in these short courses.

For example, Wang Kuei-pin, age 52 and an experienced cotton grower, explains how he had signed up for several of those early courses on cotton. He returned often during the period of his studies to the land his family and fellow work-team members were farming and was able to apply the scientific theories to improve cultivation on their three hectares. Wang then took a one-year course after which he was made cotton consultant for the whole of Chienping County. Wherever he goes, he passes on his knowledge of improved methods of growing cotton and helps to dispel doubts about the new forms of education and farming.

The results of the three-month trial courses showed that selecting rural peasants as students helped to upgrade the skills of local people and avoided the problem of students leaving the countryside with great expectations of work in the city. So, three-year courses were offered to rural young people with middle school education and two or more years of agricultural experience. Reaction to the college was at first varied. Some people asked, "All that college and they'll still be peasants? Who'll want to go? In the past we'd send one of our young people to college in the city and he'd never come back. Won't this

happen again?" But because of the new teaching methods and the structure of the schooling, the fears expressed by some have disappeared.

New Teaching Methods

Although the main purpose of the Chaoyang Agricultural College is to train agricultural technicians, the students also receive a political education. On the first day, they study Chairman Mao's writings on education and each student is given a shovel and a hoe which he or she will use throughout the next three years. They also read the works of Marx, Engels, Lenin, Stalin, and Mao which emphasize the importance of class struggle.

Learning from Tachai is another part of the college's underlying philosophy. The Tachai production brigade in Shansi Province is now a national model for agriculture. Through self-reliance, hard work, and innovative thinking, the brigade has now become a prosperous example for others in poor mountainous regions. Each department at Chaoyang Agricultural College has its own Learn-from-Tachai "bases" -- experimental plots, orchards, high yield plots, veterinary hospitals, breeding stations, etc. At these places the students study, work, and experiment with ways to increase production using the few resources they have.

During the first year at the college, which now has classrooms and residential buildings, the students study scientific management and agricultural theory, and master the basic techniques through research and production plots. In the second year, they spend seven to eight months at school and the rest of the year working in the fields with the production teams in their own communes. In the third year, they spend four or five months at school and the rest at home. While they are with their own production teams, the students assist in planning for production and experimental farm projects. They also hold classes to pass on their knowledge to fellow team members. Working in their home areas, the students use what they have learned to analyze and solve problems that actually exist. The teachers visit the various production teams to monitor and guide the

students' work. When they return to the college, the students reflect on what they have gained politically and professionally through their work at home. To illustrate, in 1974, 289 students taught more than 200 classes involving over 3,000 people in their home production teams. They helped commune members organize 72 experimental stations and joined them in cultivating plots with new varieties of cotton, corn, and sorghum. They also grafted 530,000 fruit trees and treated 24,000 sick or hurt animals.

Colleges such as the Chaoyang Agricultural College have been started in nearly 150 counties throughout China. They are a promising beginning to provide the vast number of middle-level technicians needed to modernize agriculture.

Factories Operate Their Own Colleges

Just as there are new forms of higher education to train people to become agricultural technicians, there are also "workers' colleges," operated by factories. These exist not only in the cities, but also in the countryside where large-scale industries are being built up. These colleges are known as July 21 Workers' Colleges because of a document issued on July 21, 1968, by Chairman Mao which stated:

> It is still necessary to have colleges of science and engineering. However, it is essential to shorten the period of schooling, put proletarian (working class) politics and values in command, and follow the road of the Shanghai Machine Tool Plant in training technicians from among the workers and peasants with practical experience, and they should return to production work after a few years' study.

Chairman Mao refers in these remarks to a successful experiment to train technicians which was conducted by the Shanghai Machine Tool Plant.

Technicians at the plant, which is famous for its high-precision grinders, come from two sources: college and university graduates (about 350 persons, some of whom have studied abroad) and technicians promoted from among the workers (about 250, most of whom had studied at secondary technical schools.) A study of these technicians revealed that those selected for training from among the workers performed better than did the group with specialized university education. The worker group was found to be more progressive in its ideas and willingness to experiment, and more able to handle production. At the same time, the specialists were judged more backward in their outlook and less competent in actual work.

Persons at the Shanghai Machine Tool Plant point to contrasting examples of technicians to illustrate this difference. One technician was a graduate of a Shanghai university. He had a year of foreign language study and four years of study in a foreign university where he got an "Associate Doctor" degree. In 1962, he started to work in the laboratory of the Department of Grinder Research at the plant. Because of the separation of theory from the practical work conditions existing in China and because of his failure to collaborate with workers, he tried doing research on his own. He worked on nearly 60 projects over a ten-year period, giving up one after the other at a great financial loss to the plant. He also ruined some 30 grinding heads trying out his individual experiments.

The second technician, a worker, started as an apprentice at the age of 14. When 18, he went to a machine building school in Shanghai for four years. He was then appointed to the Department of Grinder Research in 1957. As the chief designer, he collaborated closely with those working under him. Within a year, they developed a large surface grinding machine which was successfully produced and which met advanced international standards.

When the machine tool plant investigated the origins of its successful new products, developed since 1958, they found that the products designed by technicians from the ranks of workers, and by technicians who worked in collaboration with workers, comprised 40% of the total in 1960, 60% in 1963 and 70% in 1967. This held true even though the university trained technicians and designers comprised the majority of the researchers in the department. On the basis of these figures, the plant decided to start its own college to prepare workers for the future needs of the machine tool industry. This scheme soon became a model which others followed.

Nine years later, similar workers' colleges were being operated by factories of all sizes and by all types of industries. Most courses are in engineering, but some are in medicine or in liberal arts. The courses last from several months to two or three years. Several hundred thousand people now attend these colleges on a full- or part-time basis. They may be operated by their own factory or by a larger factory in the same trade. The students are chosen by their fellow workers and, when they return to work fulltime, they become part of the factory's advanced technical force.

A factory-run college differs from a regular university in that it is designed to train people in the factory's actual production. An industry which is expanding trains its own workers in advanced skills and places them in the new positions instead of hiring people from outside. Most of the teachers are experienced workers of the factory, but there are also engineers and other personnel who come from the technical schools to teach on a part-time basis. Assisted by the factory's workers and engineers, the teaching staff compile their own materials. The texts, incorporating production experience and innovations in that particular industry, are practical and reflect new technical advances.

Teaching is done on the principle of "practice, knowledge, again practice, again knowledge." In the Shanghai Machine Tool Plant, the term of study is arranged in four stages. First, fundamental courses

are given in such areas as drawing, and the manufacture of grinders. Second, students learn theories concerning the design and making of machines typical for use in the plant. The third stage, built around the problems encountered in practice, continues a systematic study of theories in courses such as higher mathematics, mechanics, and hydraulics. In the last stage, the students work in plant shops for additional practice. They apply their knowledge to design and make a complete machine tool with help from workers and engineers.

The July 21 Workers' College is not found only in factories. Other types of enterprises and companies have adapted the idea to their own needs. For example, in 1972, the Tientsin Ocean-Shipping Company discovered that as China established relations with more and more countries, the need for trained personnel grew much faster than the traditional merchant marine institutes could train people. So they began a July 21 College on board ship. One trip at sea of about five months constitutes a school term. Students are chosen from the ship's crew. Teachers are the ship's leading engineers and wheelsmen. Basic theory appropriate to the trade is taught and supplemented by practical instruction on the ship's equipment, instruments, and so forth. Seamen attending a part-time course qualify as junior wheelsmen in two years. In the past two and one half years, this college has trained 650 people.

The Ministry of Railways Second Engineering Bureau faced a serious lack of trained personnel for worksites along a line which stretched through the mountains of five provinces. Instead of waiting for the government to assign a few university graduates each year, the bureau opened a July 21 Workers' College with fourteen branches located at the different worksites. Its 21 specializations included tunnel engineering, bridge construction engineering, management, finance, medicine, and teaching.

New Teaching Materials

One of the problems experienced in the middle schools, agricultural colleges, and the July 21 Workers' University is the inadequacy of the teaching materials and texts developed before the Cultural Revolution. After the reforms were initiated, it was discovered that the books were too theoretical and did not incorporate the concepts of practical application. So, new materials are being developed, especially in the new agricultural colleges and in the July 21 universities.

The following illustrates how teaching materials are being made and tailored to the training of middle-level technicians which China most needs at this time.

The July 21 Workers' University at the Shanghai Machine Tool Plant presently offers a three-year course to enable engineers to design and make grinding machines. The course uses a 246-page university level textbook, Design and Manufacture of Grinding Machines, written by a team of teachers, students, workers, and engineers at the July 21 University and published by the Shanghai People's Press. After critically analyzing the old texts, the team rewrote the book, retaining what was useful, and incorporating scientific advances and improved techniques in order to link theory more closely with practice. The teaching material continues to be revised as new information, based on experiences in production, becomes available.

The Worker-Students

While China's major universities cannot hope to expand fast enough to meet all of the country's development needs, the workers' colleges have shown themselves to be a vehicle for both the training of technical personnel and the development of intellectual and decision-making skills among working people. Students from the Shanghai Machine Tool Plant are able to design and manufacture machine tools. They can both direct production and function as ordinary workers in a factory. While studying

the scientific theories needed in the machine tool industry, they also study the social theories of Marx, Lenin and Mao. They participate in planning and decision-making for the factory, as well as in its production and operation. The worker-students relate these efforts to China's overall development goals. And as more and more workers in the cities and in the countryside learn technical and political theory, knowledge is no longer the monopoly or privilege of a few persons, thus reducing possibilities for its use as the basis of rank and special privilege.

The worker-students in the new types of agricultural colleges, and in the July 21 Workers' Colleges in industry and trade, illustrate the integration of mental and physical labor. The Chinese believe that this integration has increased both production and the workers' effective participation in their country's development, two of China's development priorities.

Summary of Educational Changes

The examples of the middle school, the agricultural college, and the July 21 Workers' College show how China is trying to put new policies for education and development into practice.

The following specific changes are noteworthy:

1. The boundaries between in-school and out-of-school learning have been broken. Most forms of formal schooling have out-of-school learning components, many involving a work practicum in industry or the agricultural sector. At the same time, many work places have started more or less formal training courses for the workers.

2. In the case of higher education for industry and agriculture, a different type of person is being selected to receive education. Students are those with ability, but often with little formal education: most already have some work experience. They are selected by joint recommendation from their fellow workers and administrators in the work places rather than by examinations, certificates, or degrees.

3. Teachers also come from a broader range of backgrounds. In one situation, a peasant may be a teacher passing on skills he or she has gained from experience. In another, the same peasant may be a student receiving instruction in new skills and knowledge. There also are certified teachers and professors teaching in both in-school and out-of-school learning situations.

4. New materials are being prepared with the greater participation of people who may have some knowledge about a particular subject area. These materials are better adapted to the students and to the tasks that need to be accomplished.

The Chinese have made these changes because they feel that such forms of education help develop China's most plentiful resource: people. It is the people who will enable the country to reach its development goals.

Community Learning Groups

New types of schooling are not the only ways in which learning takes place. Many problems that need to be solved do not require sending someone to a special course. Many of the older people in the cities and rural areas never had the chance to receive a general education. So, in 1968, when revolutionary committees were being formed in the schools, hospitals, and factories to assist in the management of work and study places, residents' committees were formed in the neighborhoods. People on the committee are elected by their neighbors and charged with the task of finding out the problems in the community and suggesting ways of solving them.

For example, Fengsheng Neighborhood in Peking has a revolutionary committee of 27 people who look after the needs of the people in two main streets and 132 lanes where 53,000 people live. The first thing the committee did was to find out what the people in the neighborhood do for a living. After making a survey, they found that there are 14,000 households. Nearly 23,000 people are workers in industry, commerce, government, education, health, or theatre. About 16,200 are young people in primary or middle school or in colleges of several types. There are 6,146 pre-school children and 7,762 "neighborhood people" who are retired persons, the elderly, or housewives who stay home to look after children.

The revolutionary committee then decided that to manage the needs of 53,000 people was too difficult for one group of 27 people, so the neighborhood was divided into 25 areas, each one with about 2,000 residents. Each residents' committee has three to six subdivisions of about 100 families, each of which serves as a basis for groups of 40-50 people who often get together for study and other matters of concern to the neighborhood.

How does Fengsheng Neighborhood solve problems and provide education? Here are a few examples: The residents in the old-style houses in Shuncheng Lane had to go down the lane to fetch water for cooking, washing clothes, and baths, and there were no nearby drains to empty the dirty water. In the summer, especially, the lanes became very muddy. The residents' committees told their representatives in the revolutionary committee; they, in turn, told the public utilities bureau about it; and the bureau installed more faucets and dug more drains in the lane. Similarly, the grocery store was too small and there was no public telephone. The residents' committee wrote the municipal trade bureau and asked that the store be expanded to include more household items and fresh vegetables so that the people would not have to walk so far. They also asked for a telephone. Within two months these changes were made. The neighborhood people call this kind of problem solving an educational process because it is up to the people to educate those who have goods and services and make them aware of the needs of the people. It is also considered a valuable educational experience for the people to discuss their needs together and to talk about their plans for improvement of their community.

The residents' committees also organize study groups and night schools for people in the lanes who want to expand their general education. These classes are voluntary and usually are attended by the "neighborhood people," the 7,762 who are home during the day and who have not had opportunities to get an education before. Generally, such groups meet two or three times a week for two hours in the morning. Each group chooses

its own leader and guide, usually from among the retired people.

On the mornings when the study groups get together, the members start coming after breakfast carrying their little stools. There are retired people, mothers carrying babies, and grandmothers pushing small children in bamboo carriages and strollers. In total, 20-25 people get together. They sit in a circle, laughing and catching up on family and neighborhood news until the group leader starts the class. The studies are along the lines of a general education program followed throughout the country by similar groups. The members read and discuss articles from the newspapers or from the works of Marx and Mao Tse-tung. The leader explains difficult points and the members discuss them in relation to their own experiences. Sometimes the time is used to acquaint people with government policies and directives or to organize activities in the neighborhood. In the beginning, eight years ago, some time was spent on literacy training if there were people in the group who could not read or write. The members of the Fengsheng group say that illiteracy no longer is a problem in most study groups like theirs. The main benefit to themselves, they report, comes from being able to discuss national or international issues and to relate them to China's future. The study has broadened their horizons and given them things to think about beyond the narrow scope of their own streets. They now feel a part of community and national development because they, too, can know and discuss what the leaders and "highly educated" people are talking about. Much of the education received in such groups deals with how to be a good citizen; moral values and the creation of cooperative attitudes are emphasized just as they are in the schools.

New Patterns and Relationships in Teaching and Learning

Although the examples given for the various forms of education described here are specific ones, they are repeated, with some variations depending on local needs, in thousands of similar ways all over China.

Summarizing some of the changes in both in-school and out-of-school education, two very important trends are noticeable. One of these has to do with who is a teacher and where teachers come from. The second has to do with new group structures which enable different types of people to get together for learning experiences. Both of these trends try to make maximum use of human resources while educating people so that their resources and skills are strengthened.

Who Teaches in China

In many cases, teacher training and the things teachers do are similar to those done in most countries in the world. The following three examples illustrate the kinds of people who are teachers and the variety of situations in which they teach.

-- Dr. Gao Shan-yiu, 61 years old, is a teacher at Shanghai Teachers' University. His training included five years (1935-1940) at Yale University in the United States. Today his professional life, like that of his colleagues, includes several distinct types of teaching activities: one-third of his time is spent teaching in the university; two-thirds is spent teaching in out-of-school or non-formal educational institutions and programs. For instance, he provides instruction at the July 21st Workers' University organized and managed by the dock workers at the Loading and Unloading District No. 3 of the Shanghai Harbor. Dr. Gao also participates in an ongoing project which sends teachers twice a year to provide one month of classroom teaching in cities in four other provinces of China. These programs offer teacher training courses by correspondence from Shanghai Teachers' University.

-- Shih Chuan-pi, 34 years old, is a worker at the Shenyang Maching Tool Plant No. 1. He is an "advanced" worker, which means that he has been recognized by co-workers and administration as skilled in his job as a machine tool operator and competent in his understanding and application of the political and development goals of China as they relate to his work unit. He spends ten to twelve hours a week, apart from his regular factory

job, teaching two types of groups: twice a week in the evenings he is the chairman of work-oriented, problem solving sessions at the Shenyang Workers' Cultural Palace with a group of 15-20 machinists from several factories in the area, and two afternoons a week he instructs students of Shenyang Middle School No. 32 where they have set up their own machine tool workshop to supplement their class work.

-- Yen Hung-en, a 47 year-old peasant expert and teacher at Litai brigade of the Chiliying Peoples' Commune, instructs middle school graduates in agricultural techniques when they come from the cities to live and work for two years in the countryside to "learn from the peasants" and assist in production. Yen's only formal education was a few years of primary school; his knowledge of agricultural theory has come through years of practice and from short term courses in agricultural science offered at the Peasants' Agricultural College in a neighboring brigade. He is an agricultural technician and, as such, his teaching role is an important link in the dissemination of information about improved varieties of wheat and corn.

These teachers come from a variety of backgrounds and training. In identifying potential teachers, the Chinese highly value practical experience and leadership qualities. In most cases, a teacher receives special training, sometimes in a formal teacher training program, but more often in short term courses that prepare the person to teach specific material to a particular group of students or workers.

New Structures for Learning

We have looked at several of the new types of education in China. Most of these forms are designed to help spread new information and to give people skills in the area of middle-level technology in agriculture and industry. They also seek to provide a broader base for the people's participation in development. It is important to note that new groups of people are now becoming students and teachers. Different groups of

people are talking to each other and exchanging ideas and experiences to an extent not possible before. This has happened principally because of the new committees, study groups, and linkages between education and work. A great deal of experimenting and critiquing of old ideas about schooling and teaching also had to take place. It would have done little good to acknowledge that older people, peasants, factory workers, and others have useful knowledge and can be teachers if there was no way for them to relate their experience to those who are the learners. But now that students and teachers go to the countryside and factory to learn from those who are already working, and factory workers and peasants sometimes teach in the schools and study in colleges, teaching and learning are an integrated part of everyone's life.

Walking on Two Legs

Many countries today worry about the costs and effectiveness of schooling and are thinking of alternate ways to educate their citizens. China has evaluated its formal system of schooling and decided that more, not less, schooling is needed to prepare the young and old for China's future. Education, like industry and agriculture, is being developed by "walking on two legs." This means that the Chinese think schooling is important for everyone, so they have made great efforts to make a minimum of five years of schooling available to all children. This is "one leg" moving forward. The "other leg" is the development of new forms of education especially for adults and working people so that they can keep pace with and participate in the modernization taking place. The Chinese have emphasized self-reliance rather than expensive outside sources of aid. They have borrowed many ideas and methods from other countries and different parts of China, but each community adapts these to its own needs. The changes in education are still continuing and the Chinese think that this is good.

We again return to the "Foolish Old Man Who Moved the Mountains." The story was used many times by Mao as a lesson in the proper spirit the people should have. A Chinese farmer, asked how that story helped him to grow better cabbages, responded quite simply:

The story means that we must start with ourselves, with what we have. We must be prepared to work hard and to work together. We needed soil to build our fields. We had discussions to plan the work. The people in the next valley needed rocks to build irrigation ditches. So we traded rocks for soil at first using only baskets over our shoulders to transport the materials. We did not achieve success all at one time. The foolish old man had the right spirit. Today we work not just with our sons and grandsons, but with the whole valley of many villages. We send people to study about fertilizer and improved water systems. Now we have a surplus of cabbage and we are starting an orchard and our own fertilizer plant. We provide assistance to poorer villages and students come from the cities to learn from us and to help us. This is how new China is being built.

Looking Toward the Future

On September 9, 1976, Chairman Mao Tse-tung died after having played the leading role in setting the direction of China's development for over 30 years. Not only had he been the Communist Party Chairman and a key figure politically since the 1930s, but it was he who provided the philosophical guidelines and leadership which enabled the country to make the progress it did in agriculture, industry, and education. He said he wanted to be remembered as a teacher, and many of his most famous essays, often based on popular traditional tales such as "The Foolish Old Man Who Moved the Mountains," were instructive in nature. Mao Tse-tung was in the forefront and played the pivotal role in the transitional periods of the Great Leap Forward (1956-58), the break with the Soviet Union (1960-62), and the Cultural Revolution (1966-69). It would be incorrect to say he was in complete control during any of these difficult and sometimes chaotic transitions, but it would be equally incorrect to underestimate his influence. He did remain in power until his death and he is venerated in China as a philosopher, teacher, and motivating force for unifying and providing direction for over 850 million people.

Several other events shook China in 1976: there was a devastating earthquake in the industrial city of Tangshan which took the world by surprise and cost many thousands of lives. There were agricultural shortages in several parts of China. And two other leading members of the Chinese Communist Party who had been with Chairman Mao from the early days before World War II also passed away -- Premier Chou En-lai and Chu Teh.

Shortly after Chairman Mao's death, there was an attempt by those holding an ultra-left line to strengthen their position in the Party and to assume stronger leadership roles, especially in education and industry. The move resulted in the house arrest of its four top leaders known as the "Gang of Four." Among the four was Chairman Mao's widow, Chiang Ch'ing,who had gained influence during and after the Cultural Revolution. In education they were supportive of admission of more working-class youth and peasant youth to universities and other forms of higher education. In order to achieve this, admission requirements such as entrance examinations were dropped, and the "open door" policy operated in the extreme in some cases. In the area of work, the Gang of Four and its followers had emphasized "correct political views," often criticizing those who wanted to increase production or encourage research. They felt specialization would lead to a resurgence of capitalist ideas.

For the past year and a half, since the arrest of the four leaders, the Chinese have launched a major campaign against the "Gang of Four" and their leftist line. China has expressed an interest in increased contact and trade with other nations and in greater efforts at modernization at home. The press speaks of the "Four Modernizations" -- in the areas of agriculture, industry, national defense, and science/technology. The Chinese feel the foundations for such modernizations have been laid and now China's science and technology is ready to enter a new stage, one that will require more emphasis on scientific research. To organize for the tasks of modernization in the four areas by the end of the century,

a national conference on science was held in Peking in the spring of 1978. The participants exchanged experience, drew up plans, and commended advanced personnel, especially scientists, engineers and technicians who had made inventions and innovations.

Changes in Educational Policies

Now that China is pushing for fast progress in the areas of science and technology, they recognize certain shortcomings in their educational system and have begun to look at how these can be remedied. They attribute the lag in scientific education to the influence of the Gang of Four who claimed that the study of natural scientific theories came from the decadent Western capitalist countries. Since the Cultural Revolution, a number of scientific research institutes had been closed and theoretical research had suffered.

Several steps are being taken so that over the next few years science and technology will be strengthened to achieve the Four Modernizations. Many of these steps affect the educational system in China.

-- The Party Central Committee has set up a National Scientific and Technological Commission to take charge of planning, coordinating and organizing the country's scientific work.

-- Provinces, counties, and cities are holding conferences on science for advanced teachers and researchers. The All China Scientific and Technological Assocation has revived its activities and academic societies are again exchanging ideas.

-- Universities and colleges have established a new enrollment system with entrance examinations and are encouraging students interested in science.

-- Some middle school graduates will go directly to the university, if they qualify academically, and by-pass the two-year work programs in the countryside.

-- Spare-time education, including vocational study through radio and television, is being further developed in the areas of science and intermediate technology.

-- The Ministry of Education is organizing personnel from all fields to compile a new set of standardized textbooks.

-- The national budget for science and education has been increased.

-- While the Chinese still maintain the principles of independence and self-reliance, they are now promoting more international academic exchanges in order to learn the most advanced science and technology.

-- Efforts are being made to promote science education and to spread scientific knowledge. Newspapers have special science columns and television has created new programs on science. Literary and artistic people are creating works with themes on science and education.

The Ministry of Education has, nevertheless, reaffirmed that education in China would continue to follow the purposes stated by Mao Tse-tung. These include combining education with productive labor in work-study programs and the three-fold emphases on all-around moral, intellectual, and physical development of China's citizens.

On February 11, 1978, the Hsin Hua News Agency published an interview which the press had with the Ministry of Education in response to questions they had received from people all over the world about the changes occurring in education. Some people expressed concern whether the entrance examinations would lead to the creation of an academic elite and give persons with more privileged backgounds and schooling better educational opportunities, thereby eliminating the progress that had been made in giving those of peasant and worker backgrounds a chance at higher education. The Ministry of Education responded by saying that an elite is not necessarily the product of examinations and selection. Furthermore, it said that in

a country like China, where not everyone could go to the university, in view of the many development tasks that remain, it is natural to select through examinations those who are most qualified. In 1977, over 5.7 million young people took the university entrance examinations, most of these from the working class or peasants since the majority of people in China are from those segments of the population. Priority will still be given to worker-peasant candidates if they qualify academically. Because elitism is believed to come from differentials in pay and in attitudes towards work, the pay scale for university graduates has been more or less equalized with other workers in China since 1949. Regarding attitudes towards work, all education in China, for young and old alike, is directed towards "serving the people," and the Chinese continue to regard proper attitude as a measure for advancement in jobs. This is part of the training to bring about a socialist consciousness and culture.

Open-door education will likely continue in China because it is the embodiment of the basic principle of combining education with productive labor. But a renewed emphasis will be put on effective classroom teaching with high standards of excellence in order to improve the quality of education. And a greater effort will be made to have the productive labor periods consist of work related to the subject area and skills taught in the schools.

In addition, the July 21 universities, which developed during the Cultural Revolution and are run by the factories, probably will be expanded. As progress is made in the areas of agriculture, industry, national defense, science and technology, there will be a need for more, not fewer, middle-level technicians. The July 21 universities will continue to train much of this skilled manpower.

The Ten Year Education Program

In February 1978, the Ministry of Education announced a Ten-Year Plan to raise the quality of all education in China. This plan includes some of the reforms mentioned above. It will also provide for a more standardized

school program: five years of primary school, three years of junior middle school, and two years of senior middle school. This raises the number of years of universal education for young people from nine to ten years. Unified curricula and study materials are being prepared with study time guaranteed for both political and cultural courses as well as a greater emphasis on high quality training in science and technology.

In the area of adult education, short-term classes, correspondence schools, and radio and T.V. courses will be expanded in order to speed up the training of competent personnel. Schools of diverse forms will continue to appear and the quality of education will be steadily improved.

Once again, the Chinese are making changes that are somewhat experimental. They do not expect everything to change overnight, but are hopeful that definite technological goals can be reached by certain times: goals such as the mechanization of farming by 1980 and the use of computer technology for industry by 1988. These goals clearly call for a greater degree of technical and scientific specialization than was provided for in the past.

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